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None

(58) Field of search

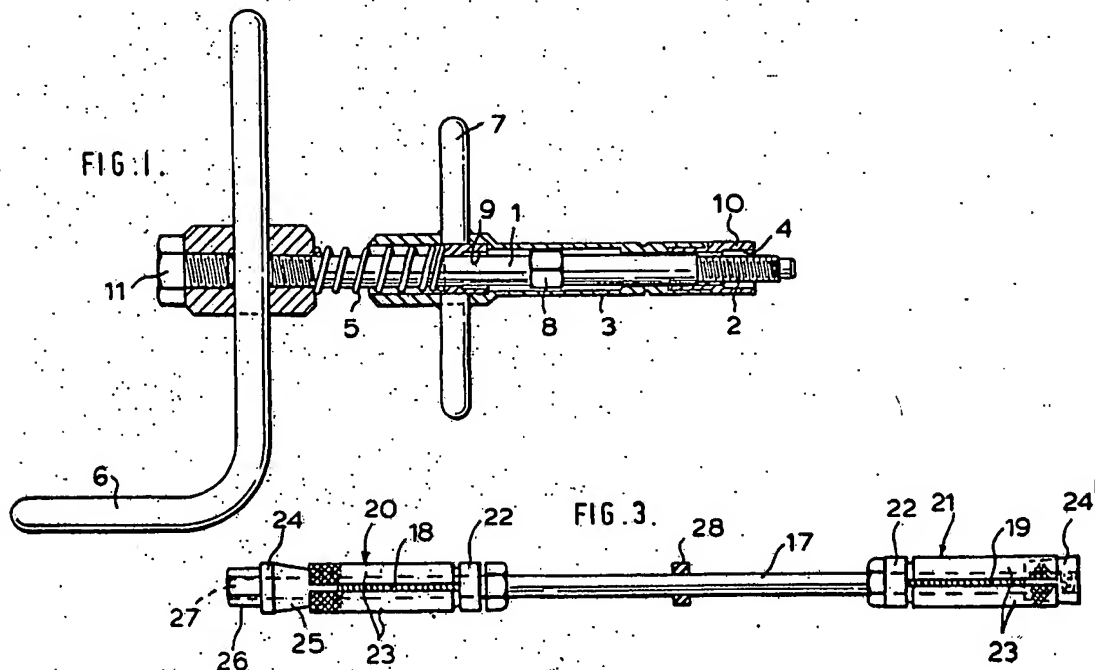
B3N

Selected US specifications from IPC sub-class

B25B

(54) Tool and remedial wall tie for use therewith

(57) The tool has a shank (1) having a threaded end (2) and a tubular portion (3) with a keyed end (4). The tubular portion (3) is slidable between a first position (as shown) wherein the threaded end (2) engages a corresponding thread (27) in the expansion nut (24) of the tie for operating a fixing device (21) on the inner threaded end (19) thereof, and a second position wherein the keyed end (4) engages a correspondingly-keyed end (26) of the nut (24) for operating the fixing device (20) on the outer threaded end (18) thereof. Spring (5) urges the tubular portion (3) into the second position wherein the tubular portion (3) and shank (1) rotate together, whereas they are independently-rotatable in the first position. The inner tie end may be threaded only, to be fixed in resin, or other fixing devices attached thereto.



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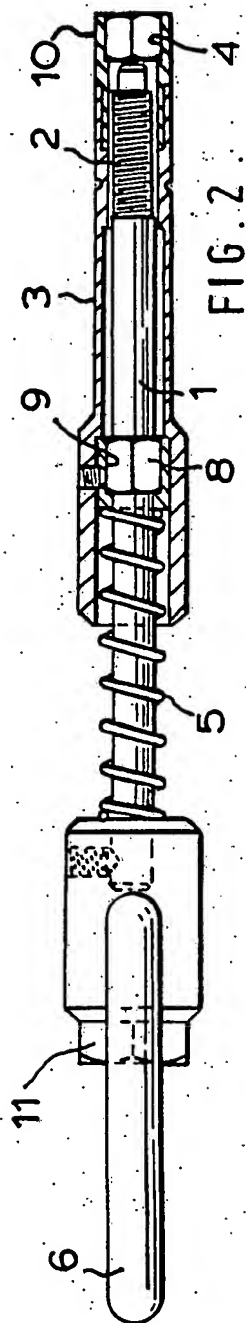


FIG. 2.

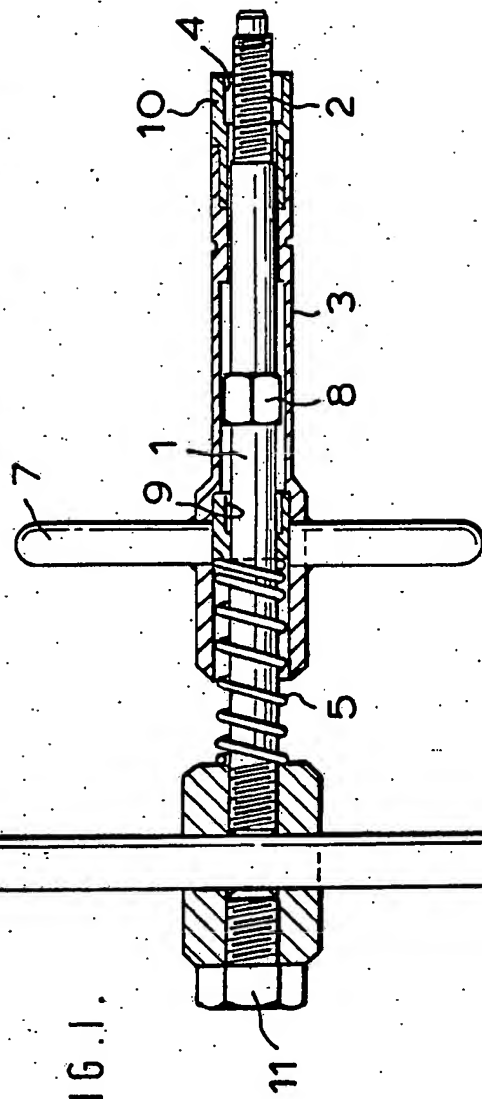


FIG. 1.

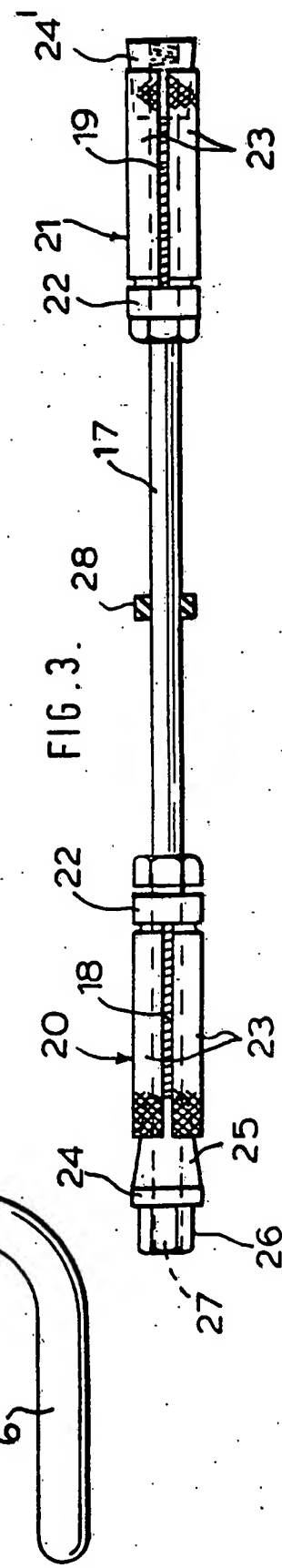
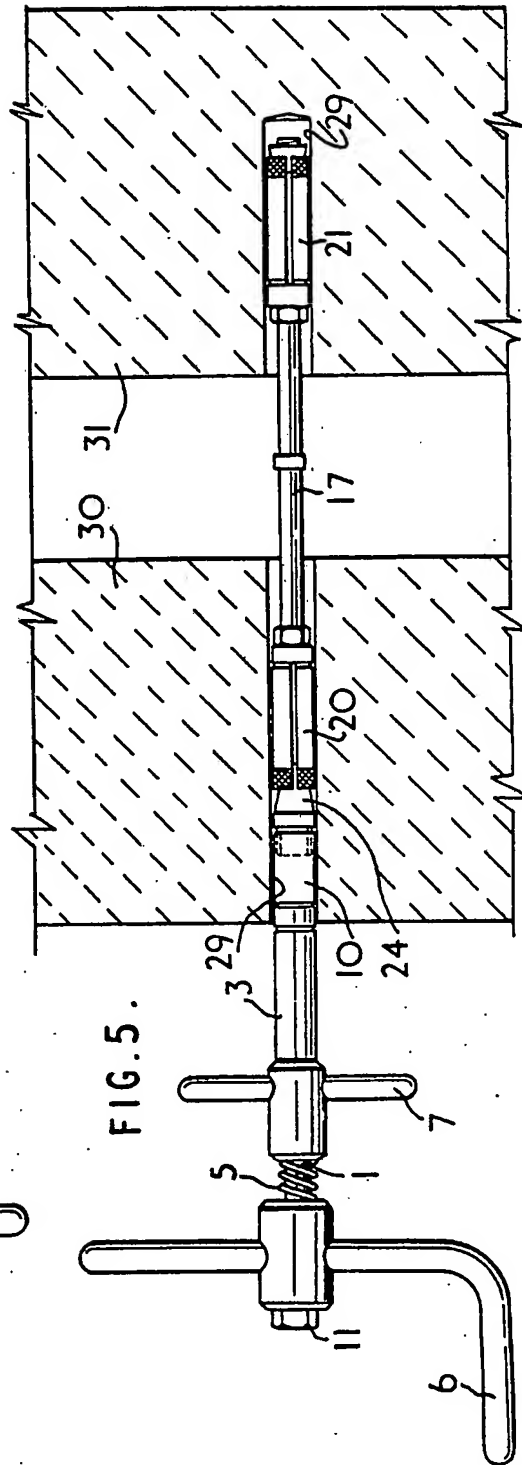
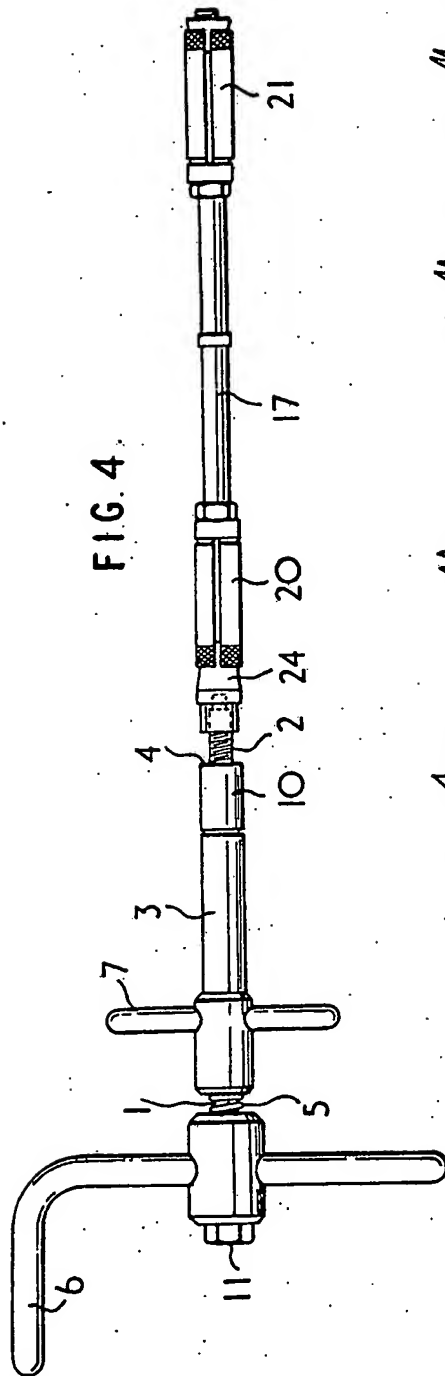


FIG. 3.



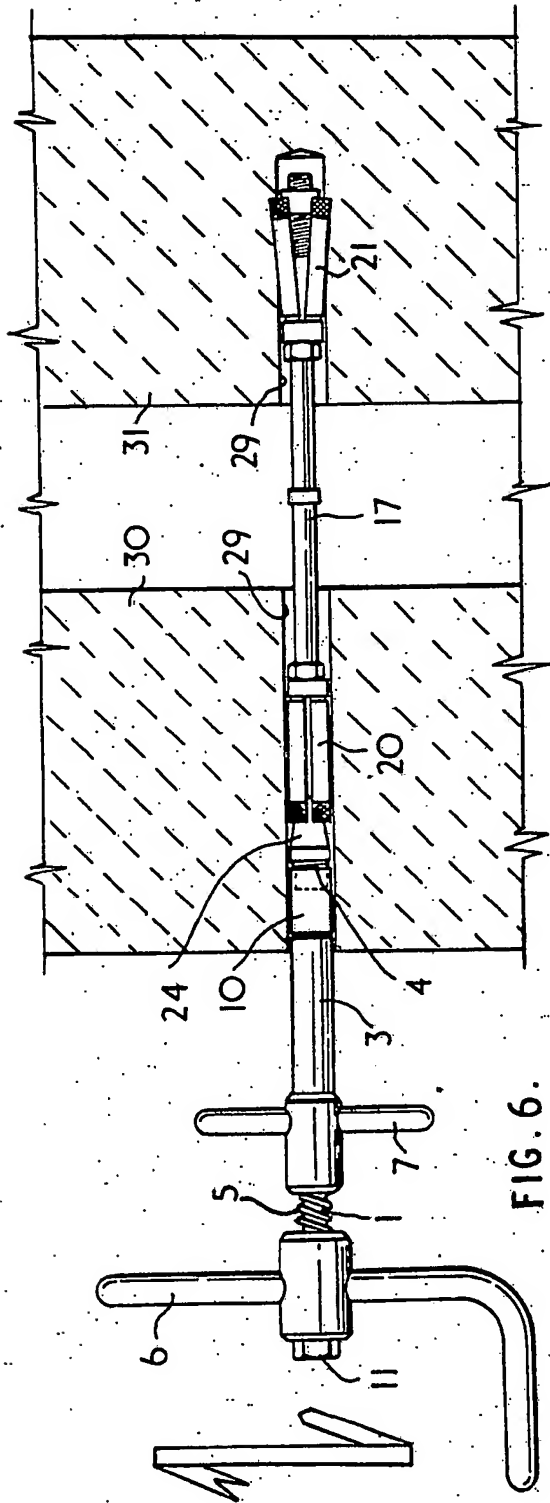


FIG. 6.

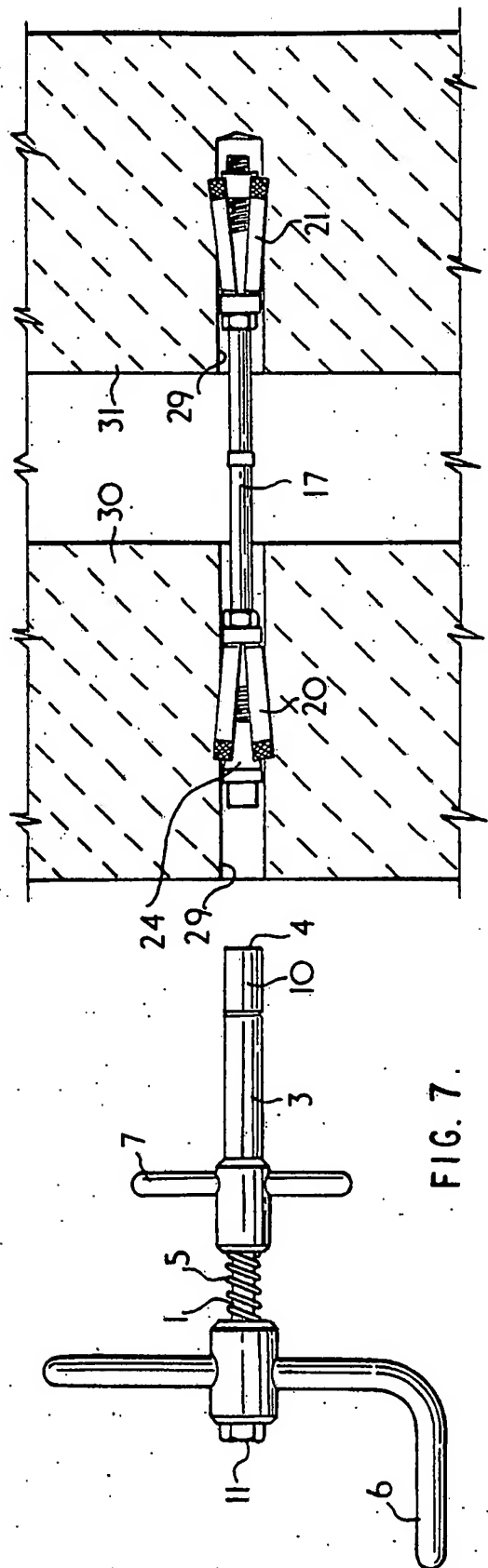
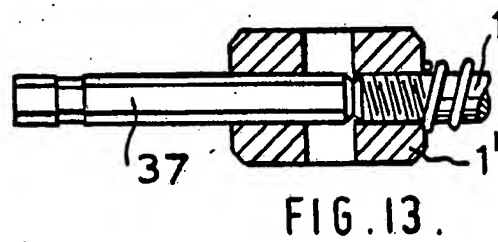
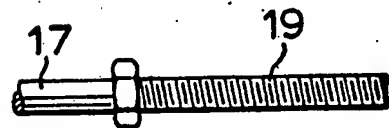
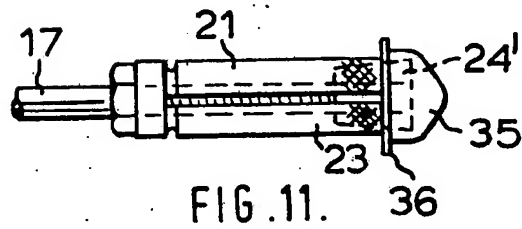
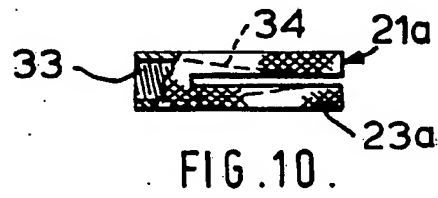
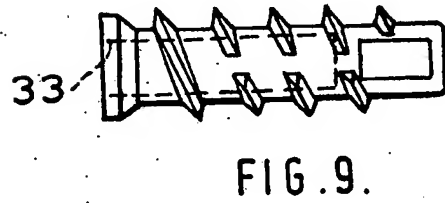
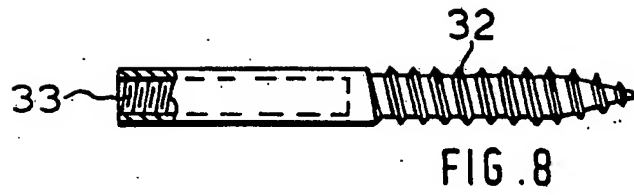


FIG. 7.

4-4



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Tool and Remedial Wall Tie for use therewith

The present invention relates to a tool and a remedial wall tie for use therewith.

Remedial wall ties are known (e.g. GB-A 1 411 077) comprising expansion means mounted on opposite ends of a tie member. In order to fix the remedial wall tie in a bore in a wall, the wall tie must generally be inserted into the bore without the expansion means on the outer end of the tie member. The inner expansion means is then expanded by means of a suitable tool, e.g. by an internally-threaded mandrel attached to an outwardly-threaded portion of the outer end of the tie member, or by means of a box spanner rotating a nut mounted on a threaded portion of the outer end of the tie member. Only when the remedial wall tie is fixed in the bore by the inner expansion means can the outer expansion means be attached to the outer end of the tie member to complete the fixing thereof in the bore.

A disadvantage of such a remedial wall tie is that it is possible during fixing to drop the second expansion means being attached to the tie member. This is more likely during cold weather, e.g. when gloves are worn,

and is particularly irritating when working at a height, e.g. on scaffolding or on a ladder.

An alternative type of known wall tie allows the outer expansion means to remain in place on insertion of the wall tie into the bore. The expansion means on both ends are then expanded simultaneously in a single operation. This type of tie has disadvantages in that the inner and outer expansion means cannot be expanded to different degrees according to the materials involved, and in that the tie cannot be withdrawn and reused once it is in position.

An object of the present invention is to provide a remedial wall tie, and a tool therefor, which may be fixed in a single operation by the tool with the outer expansion means already in place, the inner and outer expansion means being independently expandable.

The invention provides a tool as claimed in Claim 1.

The invention further provides a remedial wall tie as claimed in Claim 12.

The invention still further provides a fixing device as claimed in Claim 24.

Embodiments of the invention will now be described with reference to the accompanying drawings, wherein:

Fig. 1 is a sectional plan view of a tool according to the present invention in a first position;

Fig. 2 is a sectional side view of the tool of Fig.1 in a second position;

Fig. 3 is a plan view of a remedial wall tie according to the invention;

Figs. 4 to 7 show in side view and in vertical section the operation of the tool and remedial wall tie of Figs. 1 to 3;

Figs. 8 to 10 show in side view alternative inner fixing devices for use with the remedial wall tie of Fig. 3;

Fig. 11 shows an alternative arrangement of the inner end of the tie of Fig.3;

Fig. 12 shows one end of the tie of Fig. 3 with the nut and expander removed; and

Fig. 13 is a sectional plan view of part of a tool similar to that of Figs. 1 and 2.

The tool shown in Figs. 1 and 2 comprises a shank 1 having a threaded end 2 and carrying a tubular portion 3 with a keyed end 4. The tubular portion 3 is slidable

along the shank 1 between a first position shown in Fig.1 and a second position shown in Fig.2. A compression spring 5 is mounted on the shank 1 and acts so as to urge the tubular portion 3 into the second position. Handles 6,7 are located on the shank 1 and the tubular portion 3 to facilitate movement of the tubular portion 3 into the first position. In the first position, the threaded end 2 of the shank 1 projects beyond the keyed end 4 of the tubular portion 3. In the second position, the keyed end 4 of the tubular member 3 projects beyond the threaded end 2 of the shank 1.

The shank 1 also comprises a keyed portion 8 engageable with a correspondingly-keyed socket 9 located on the interior surface of the tubular portion 3. In the first position (shown in Fig.1), the keyed portion 8 and the correspondingly-keyed socket 9 are disengaged and the shank 1 and the tubular portion 3 are independently rotatable. In the second position (shown in Fig.2), the keyed portion 8 and the correspondingly-keyed socket 9 are engaged and the tubular portion 3 rotates with the shank 1. The keyed portion 8 and the correspondingly-keyed socket 9 also serve as stop means

whereby the movement of the tubular portion 3 along the shank 1 under the action of the spring 5 is limited.

A hexagonal head 11 is provided on the end of the shank 1 remote from the threaded end 2 to allow a torque wrench to be fitted thereto.

The tool as shown in Figs. 1 and 2 is for use with a remedial wall tie, e.g. as shown in Fig. 3.

In Fig. 3, a remedial wall tie comprises a tie member 17 having opposed threaded ends 18, 19 carrying respective fixing devices in the form of expansion means 20, 21. Each expansion means comprises an expander 22 having shield segments 23 and an expansion nut 24 or 24' having a frusto-conical portion 25. As the nut 24, 24' is tightened, it moves inwardly on the member 17 forcing the segments 23 apart. The only difference between this and a conventional remedial wall tie is the provision of a correspondingly-keyed portion 26 on the nut 24 engageable with the keyed end 4 of the tubular portion 3 of the tool shown in Figs. 1 and 2. The nut 24 has a threaded through-bore 27 extending through the correspondingly-keyed portion 26 and the frusto-conical portion 25.

A ring 28, e.g. of rubber or plastics, on the tie member

17 prevents movement of moisture along the tie member.

The tool of Figs. 1 and 2 may be operated to fix the remedial wall tie of Fig. 3 as shown in Figs. 4 to 7 wherein a bore 29 is formed in front and rear walls 30, 31 of a cavity wall.

The handles 6,7 are first pressed together such that the tubular portion 3 is in the first position, i.e., with the threaded end 2 of the shank 1 projecting beyond the keyed end 4 of the tubular portion 3. The threaded end 2 may then be brought into engagement with the threaded through-bore 27 extending through the nut 24 of the tie as shown in Fig.4. The handles 6,7 are then released such that the tubular portion 3 moves under the action of the spring 5 and the keyed end 4 engages with the correspondingly-keyed portion 26 of the nut 24. The handle 7 is then held stationary and the handle 6 is rotated clockwise until the end of the shank 1 is brought into locking engagement with the end of the member 17. The tie is then inserted into the bore 29 as shown in Fig.5.

In order to expand the inner expansion means 21 into the position shown in Fig.6, the handle 6 is rotated clockwise and the handle 7 is left free to rotate, although the keyed portion 8 and the

correspondingly-keyed socket 9 are not in engagement. The nut 24 therefore rotates with the threaded end 18 and the outer expansion means 20 do not expand. However, friction between the inner expansion means 21 and the walls of the bore 29 cause relative rotation between the expansion nut 24 and the threaded end 19. The expander 22 of the inner expansion means 21 is thus expanded until the required torque is attained. This may be checked by fitting a torque wrench to the hexagonal head 11 located on the shank 1 of the tool.

When the inner expansion means 21 are expanded to the required torque, the outer expansion means 20 may then be expanded to the position shown in Fig.7. In order to achieve this, the handle 7 is held stationary while the handle 6 is rotated anticlockwise, thus bringing the threaded end 2 of the shank 1 out of engagement with the threaded through-bore 27. The keyed end 4 and the correspondingly-keyed portion 26 remain in engagement. The action of the spring 5 forces the tubular portion into the second position. The keyed portion 8 and the correspondingly-keyed socket 9 are now engaged and clockwise rotation of the handle 6 causes the tubular portion 3 to rotate, thus rotating the nut 24 with respect to the threaded end 18. The expander 22 of the outer expansion means 20 is expanded and the required torque may be attained and measured as before. The tool

is then simply pulled out of the bore 29 as shown in Fig.7 and the tie is fixed. The bore may be made good immediately or at a later stage.

It will be seen that at no stage is it necessary to dismantle or assemble parts of the remedial wall tie. Thus fixing is made much easier and the risk of dropping parts is virtually eliminated.

The tool may also be used to retract a remedial wall tie, if necessary, by reversing the above described steps. This is particularly useful if the inner expansion means 21 do not grip the walls of the bore 29. The tool is used to extract the remedial wall tie, and the nut 24' is tightened manually to expand the shield segments 23 somewhat so that the expansion means 21 will be in frictional engagement with the bore 29 when the remedial wall tie is again inserted.

The expansion means 21 on the inner end of the remedial wall tie may be replaced by any other suitable fixing device.

In Fig. 8, an inner-end fixing device has a wood-screw portion 32 and an internal machine-threaded portion 33. The steps described above to fix the inner expansion means 21 are performed in a similar manner to fix the

fixing device of Fig. 8 when used as an inner fixing device. The wood screw portion 32 may be screwed directly into a wooden portion of the inner wall, e.g. of a timber-framed building, or into a plug, e.g. of plastics, inserted into the bore 29.

In a similar way, the fixing device of Fig. 9 may be used as an inner fixing device. Here an anchor bolt or "turbo" anchor, e.g. for fixing in a low density concrete block, also has an internal machine-threaded portion 33 engageable by the threaded end 2 of the shank 1 of the tool shown in Figs. 1 and 2.

The fixing devices shown in Figs. 8 and 9 may also be used with conventional remedial wall ties, and not just with the remedial wall tie according to the present invention.

Fig. 10 shows an alternative inner end expansion device 21a, also having an internal machine-threaded portion 33. The device has shield segments 23a which are textured to encourage the device to grip the walls of the bore. The internal threaded portion 33 communicates with a tapering bore 34 such that the progression of the threaded end 19 of the tie member 17 along the bore 34 causes expansion of the device.

When a conventional fixing device as shown in Fig. 3 is used, it is quite common for dust and dirt to enter the threaded bore of nut 24' located on the inner end of the tie. This can impair the expansion of the inner expanding means 21. In order to prevent this, a plastics cap 35 (shown in Fig. 11) is placed over the end of the nut 24' such that expansion of the shield segments 23 is not impeded. The cap 35 has a collar 36 which enhances the gripping between the tie and the wall of the bore. It should be noted that the cap 35 may equally cover the ends of the shield segments 23 if desired. The segments 23 will then break the cap 35 as expansion increases.

As mentioned above, the tie may be removed from the bore if the inner expansion means 21 cannot grip the wall of the bore. The expansion means 21 are then expanded slightly and the tie inserted. As an alternative to manually adjusting the inner expansion means until gripping is achieved, the inner end of the tie may be resin-bonded into the bore. Sufficient gripping is then attained to allow the inner expansion means to be expanded as described above.

Alternatively, the expander 22 and nut 24' may be removed completely as shown in Fig. 12 and the shaft 17 inserted into a resin filled bore where the threaded end

19 provides a sufficient key against withdrawal after the resin has set. The outer expansion means 20 is expanded by nut 24 in the normal way.

The tool described in detail above can be adapted for use with a power tool such as a reversible torque screwdriver. Figure 13 shows one end of a tool similar to that shown in Figures 1 and 2 adapted in this way. In the adaptation, the handle 6 and the hexagonal nut 11 are omitted from the end 1' of the shank 1. In place of the hexagonal nut 11, a rigid member 37 is pressed into the shank end 1'. The rigid member 37 has a hexagonal cross-section and extends beyond the shank end 1' so that it may be received by a power tool (not shown) and rotated thereby. Thus the time taken to expand (or contract) each expansion means can be greatly reduced. It is also envisaged that a tool according to the invention may be readily adaptable between the manually operated version shown in Figures 1 and 2 and the adaptation shown in Figure 13 merely by the provision of interchangeable shank ends 1'.

Claims.

1. A tool for use in fixing a remedial wall tie having inner and outer ends each carrying a fixing device for fixing the tie in a bore in a wall, the tool comprising a shank having a threaded end, a tubular portion mounted on the shank and having a keyed end, the tubular portion being slidable between a first position in which the threaded end of the shank is engageable with a corresponding thread in the outer end of the tie for operating the fixing device on the inner end thereof and a second position in which the keyed end of the tubular portion is engageable with a correspondingly-keyed end of the outer end of the tie for operating the fixing device thereon, and engaging means for rotatably engaging the shank and the tubular portion when the tubular portion is in the second position, the shank and tubular portion being independently rotatable when the tubular portion is in the first position.
2. A tool as claimed in Claim 1, further comprising bias means urging the tubular portion into the second position.
3. A tool as claimed in Claim 1 or 2, wherein the engaging means comprise a keyed socket and a correspondingly-keyed portion.

4. A tool as claimed in Claim 3, wherein the keyed socket and correspondingly-keyed portion are located on the tubular portion remote from the keyed end and on the shaft remote from the threaded end respectively.

5. A tool as claimed in any one of the preceding claims, wherein the bias means comprise a compression spring on the shank.

6. A tool as claimed in any one of the preceding claims, wherein a handle is located on the shank remote from the threaded end thereof.

7. A tool as claimed in any one of the preceding claims, wherein means are provided for enabling the tubular portion to be moved from the second position into the first position.

8. A tool as claimed in Claim 7, wherein the enabling means comprise a handle located on the tubular portion.

9. A tool as claimed in any one of the preceding claims, wherein stop means are provided for preventing movement of the tubular portion away from the first portion beyond the second position.

10. A tool as claimed in Claim 8, wherein the engaging means and the stop means comprise the same components.

11. A tool as claimed in any one of the preceding claims and adapted to be received by a power tool for rotation about the longitudinal axis of the shank thereby.

12. A tool for use in fixing a remedial wall tie having inner and outer ends each carrying a fixing device for fixing the tie in a bore in a wall, the tool being substantially as herein described with reference to Figs. 1, 2, 4 to 7 and 13 of the accompanying drawings.

13. A remedial wall tie for use with the tool as claimed in any one of the preceding claims, comprising inner and outer ends, wherein the outer end carries a fixing device for fixing the tie in a bore in a wall, the fixing device comprising expansion means having an expansion nut with an internal, machine-threaded through bore mounted on a correspondingly-threaded portion of the said outer end and for receiving the threaded end of the shank of the tool, the nut also having a keyed end for engagement by the keyed end of the tubular portion of the tool, and the inner end comprises a screw-threaded portion whereby the inner end may be embedded in resin in the interior of the bore.

14. A remedial wall tie for use with the tool as claimed in any one of claims 1 to 12, comprising inner and outer ends each carrying a fixing device for fixing the tie in a bore in a wall, wherein the fixing device on the outer end comprises expansion means having an expansion nut with an internal, machine-threaded through bore mounted on a correspondingly-threaded portion of the said outer end and for receiving the threaded end of the shank of the tool, the nut also having a keyed end for engagement by the keyed end of the tubular portion of the tool.

15. A remedial wall tie as claimed in Claim 14, wherein the fixing device on the inner end comprises an externally screw-threaded member.

16. A remedial wall tie as claimed in Claim 15, wherein the screw-threaded member is internally machine-threaded and is mounted on a correspondingly machine-threaded portion at the inner end of the wall tie.

17. A remedial wall tie as claimed in Claim 15 or 16, wherein the screw-threaded member is a wood screw or turbo anchor.

18. A remedial wall tie as claimed in Claim 14, wherein the fixing device on the inner end comprises expansion means having an expansion nut with an internally

machine-threaded through-bore mounted on a correspondingly-threaded portion of the said inner end.

19. A remedial wall tie as claimed in Claim 14, wherein the fixing device on the inner end comprises internally machine-threaded expansion means mounted on a correspondingly machine-threaded portion at the inner end of the wall tie for forcing apart segments of the expansion means.

20. A remedial wall tie as claimed in Claim 18, wherein a cap is provided on the expansion nut of the fixing device on the inner end for preventing debris from entering the internal through-bore.

21. A remedial wall tie as claimed in Claim 20, wherein the cap is made of a plastics material.

22. A remedial wall tie as claimed in any one of Claims 14 to 21, wherein the fixing device on the inner end comprises means for preventing rotation of the said fixing device in the bore.

23. A remedial wall tie as claimed in Claim 22, wherein the rotation-preventing means comprise a collar extending radially from the fixing device on the inner end.

24. A remedial wall tie as claimed in Claim 23, wherein the collar is made of a plastics material.

25. A remedial wall tie as claimed in any one of Claims 14 to 24, wherein the or each expansion nut comprises a frusto-conical portion for forcing apart segments of a respective expander.

26. A remedial wall tie for use with the tool as claimed in any one of Claims 1 to 12, the remedial wall tie being substantially as herein described with reference to Figs.3 to 7 or Fig. 12 of the accompanying drawings.

27. A fixing device for use on the inner end of a remedial wall tie as claimed in any one of Claims 14 to 17 and 21 to 25, the fixing device having an external thread for fixing in a bore in a wall and a machine-threaded portion engageable with a corresponding machine-threaded portion at the inner end of the remedial wall tie.

28. A fixing device as claimed in Claim 27, wherein the external thread is a wood-screw thread.

29. A fixing device as claimed in Claim 27, wherein the fixing device is in the form of a turbo anchor.

30. A fixing device as claimed in any one of Claims 27 to 29, wherein the machine-threaded portion of the fixing device is formed internally of the fixing device.

31. A fixing device for use on the inner end of a remedial wall tie as claimed in any one of Claims 14 to 18 and 22 to 26, the fixing device being substantially herein described with reference to any one of Figs. 8 to 11 of the accompanying drawings.